Claims:

1. A method of identifying a G protein coupled receptor signaling inhibitor, which comprises:

(a) providing a peptide library based on a native G protein coupled receptor binding peptide;

(b) screening said peptide library for high affinity binding to said G protein coupled receptor;

(c) selecting a member of said peptide library having binding to said G protein coupled receptor of higher affinity than that of the native peptide;

(d) providing a library of candidate compounds to screen for binding to said G protein coupled receptor;

(e) screening said library of candidate compounds for high affinity binding to said G protein coupled receptor in competition with a member of said peptide library selected in step (c); and

(f) identifying a member of said library of candidate compounds having binding to said G protein coupled receptor of equal or higher affinity than that of the peptide selected in step (c).

2. A method of claim 1, wherein said screening of step (b) or step (e) is performed by testing for binding to an intact G protein coupled receptor.

3. A method of claim 1, wherein said screening of step (b) or step (e) is performed by testing for binding to at least an intracellular fragment of a G protein coupled receptor.

4. A method of claim 1, wherein said G protein coupled receptor binding peptide of step (a) is a G protein subunit or fragment thereof.

5. A method of claim 4, wherein said G protein subunit fragment is from about 7 to about 70 amino acids long.

6. A method of claim 4, wherein said G protein subunit fragment is from about 7 to about 55 amino acids long.

7. A method of claim 4, wherein said G protein subunit fragment is about 8 to about 50 amino acids long.

8. A method of claim 4, wherein said G protein subunit fragment is about 9 to about 23 amino acids long.

9. A method of claim 4, wherein said G protein subunit fragment is about 11 amino acids long.

10. A method of claim 4, wherein said G protein subunit is a Gα subunit.

11. A method of claim 4, wherein said G protein coupled receptor binding peptide is a Gα subunit carboxyl terminal peptide.

12. A method of claim 4, wherein said G protein subunit is a Gβγ dimer.

13. A method of claim 1, wherein said screening of step (b) comprises at least two sequential binding assays.

14. A method of claim 13, wherein at least one of said sequential binding assays is a competitive binding assay.

15. A method of claim 1, wherein said screening of step (b) is a competitive binding assay.

16. A method of claim 14, wherein said competitive binding assay is characterized by co-incubation of members of said peptide library with said G protein coupled receptor binding peptide.

17. A method of claim 15, wherein said competitive binding assay is characterized by co-incubation of members of said peptide library with said G protein coupled receptor binding peptide.

18. A method of claim 15, wherein said peptide library members are capable of providing a detectable signal.

19. A method of claim 1, wherein said candidate compounds of step (e) are capable of providing a detectable signal.

20. A method of claim 1, wherein said screening is an enzyme-linked immunosorbant assay.

21. A method of claim 1, wherein binding to said G protein coupled receptor is determined by measuring a signal

generated from interaction of an activating ligand with said G protein coupled receptor.

22. A method of claim 21, wherein activation of said G protein coupled receptor is determined.

23. A method of claim 21, wherein inhibition of said G protein coupled receptor is determined.

24. A method of claim 1, wherein said peptide library is a combinatorial peptide library.

25. A method of claim 24, wherein said combinatorial peptide library is a protein-peptide fusion protein library.

26. A method of claim 25, wherein said protein-peptide fusion protein library is a maltose binding protein-peptide fusion protein library.

27. A method of claim 1, wherein said peptide library is a peptide display library.

28. A method of claim 1, wherein said library of candidate compounds of step (d) is a focused library of candidate compounds based on the structure of a compound selected in step (c).

29. A method of claim 20, wherein said enzyme-linked immunosorbant assay comprises the steps of:

(a) immobilizing said G protein coupled receptor onto a solid support;

(b) providing a protein-peptide fusion protein display library;

(c) incubating members of said protein-peptide fusion protein display library with said immobilized G protein coupled receptor in the presence of said G protein coupled receptor binding peptide under conditions such that members of protein-peptide fusion protein display library having a binding affinity for said G protein coupled receptor at least as high as said G protein coupled receptor binding peptide bind to said immobilized G protein coupled receptor;

(d) removing unbound members of said protein-peptide fusion protein display library;

(e) incubating said bound protein-peptide fusion protein display library with antibodies which specifically recognize the protein portion of said protein-peptide fusion protein display library members under conditions such that said antibodies specifically bind to said protein-peptide fusion protein display library members;

(f) removing unbound antibodies; and

(g) detecting said bound antibodies.

30. A method of claim 29, wherein said protein-peptide fusion protein display library is a maltose binding protein-peptide fusion protein display library and said antibodies are anti-maltose binding protein antibodies.

31. An enzyme-linked immunosorbant assay which comprises the steps of:

(a) immobilizing a G protein coupled receptor onto a solid support;

(b) providing a protein-peptide fusion protein display library;

(c) incubating members of said protein-peptide fusion protein display library with said immobilized G protein coupled receptor in the presence of said G protein coupled receptor binding peptide under conditions such that members of protein-peptide fusion protein display library having a binding affinity for said G protein coupled receptor at least as high as said G protein coupled receptor binding peptide bind to said immobilized G protein coupled receptor;

(d) removing unbound members of said protein-peptide fusion protein display library;

(e) incubating said bound protein-peptide fusion protein display library with antibodies which specifically recognize the protein portion of said protein-peptide fusion protein display library members under conditions such that said antibodies specifically bind to said protein-peptide fusion protein display library members;

(f) removing unbound antibodies; and

(g) detecting said bound antibodies.

32. An enzyme-linked immunosorbant assay of claim 33, wherein said protein-peptide fusion protein display library is a maltose binding protein-peptide fusion protein display library and said antibodies are anti-maltose binding protein antibodies.

33. A method of claim 1, wherein said library of candidate compounds is a peptide library.

34. A method of claim 1, wherein said library of candidate compounds is a small molecule library.

35. A compound identified by a method according to claim 1.

36. A compound identified by a method according to claim 29.

37. A method of identifying a G protein coupled receptor signaling inhibiting peptide, which comprises:

(a) providing a peptide library based on a native G protein coupled receptor binding peptide;

(b) screening said peptide library for high affinity binding to said G protein coupled receptor; and

(c) selecting a member of said peptide library having binding to said G protein coupled receptor of higher affinity than that of the native peptide.

38. A method of claim 37, wherein said screening of step (b) is performed by testing for binding to an intact G protein coupled receptor.

39. A method of claim 37, wherein said screening of step (b) is performed by testing for binding to at least an intracellular fragment of a G protein coupled receptor.

40. A method of claim 37, wherein said G protein coupled receptor binding peptide of step (a) is a G protein subunit or fragment thereof.

41. A method of claim 40, wherein said G protein subunit fragment is from about 7 to about 70 amino acids long.

42. A method of claim 40, wherein said G protein subunit fragment is from about 7 to about 55 amino acids long.

43. A method of claim 40, wherein said G protein subunit fragment is from about 8 to about 50 amino acids long.

44. A method of claim 40, wherein said G protein subunit fragment is from about 9 to about 23 amino acids long.

45. A method of claim 40, wherein said G protein subunit fragment is about 11 amino acids long.

46. A method of claim 40, wherein said G protein subunit fragment is a Gα subunit.

47. A method of claim 40, wherein said G protein coupled receptor binding peptide is a Gα subunit carboxyl terminal peptide.

48. A method of claim 40, wherein said G protein subunit is a Gβγ dimer.

49. A method of claim 37, wherein said screening of step (b) comprises at least two sequential binding assays.

50. A method of claim 49, wherein at least one of said sequential binding assays is a competitive binding assay.

51. A method of claim 37, wherein said screening of step (b) is a competitive binding assay.

52. A method of claim 50, wherein said competitive binding assay is characterized by co-incubation of members of said peptide library with said G protein coupled receptor binding peptide.

53. A method of claim 51, wherein said competitive binding assay is characterized by co-incubation of members of said peptide library with said G protein coupled receptor binding peptide.

54. A method of claim 51, wherein said peptide library members are capable of providing a detectable signal.

55. A method of claim 37, wherein said screening is an enzyme-linked immunosorbant assay.

56. A method of claim 37, wherein binding to said G protein coupled receptor is determined by measuring a signal generated from interaction of an activating ligand with said G protein coupled receptor.

57. A method of claim 56, wherein activation of said G protein coupled receptor is determined.

58. A method of claim 56, wherein inhibition of said G protein coupled receptor is determined.

59. A method of claim 37, wherein said peptide library is a combinatorial peptide library.

60. A method of claim 59, wherein said combinatorial peptide library is a protein-peptide fusion protein library.

61. A method of claim 60, wherein said protein-peptide fusion protein library is a maltose binding protein-peptide fusion protein library.

62. A method of claim 37, wherein said peptide library is a peptide display library.

63. A method of identifying a G protein coupled receptor signaling inhibitor compound, which comprises:

(a) providing a library of candidate compounds to screen for binding to said G protein coupled receptor;

(b) providing a high affinity G protein coupled receptor binding peptide;

(c) screening said library of candidate compounds for high affinity binding to said G protein coupled receptor in competition with said high affinity G protein coupled receptor binding peptide; and

(d) identifying a member of said library of candidate compounds having binding to said G protein coupled receptor of equal or higher affinity than that of the peptides of step (b).

64. A method of claim 63, wherein said screening of step(c) is performed by testing for binding to an intact G protein coupled receptor.

65. A method of claim 63, wherein said screening of step (c) is performed by testing for binding to at least an intracellular fragment of a G protein coupled receptor.

66. A method of claim 63, wherein said G protein coupled receptor binding peptide of step (b) is a G protein subunit or fragment thereof.

67. A method of claim 66, wherein said G protein subunit fragment is about 7 to about 70 amino acids long.

68. A method of claim 66, wherein said G protein subunit fragment is about 7 to about 55 amino acids long.

69. A method of claim 66, wherein said G protein subunit fragment is about 8 to about 50 amino acids long.

70. A method of claim 66, wherein said G protein subunit fragment is about 9 to about 23 amino acids long.

71. A method of claim 66, wherein said G protein subunit fragment is 11 amino acids long.

72. A method of claim 66, wherein said G protein subunit is a Gα subunit.

73. A method of claim 66, wherein said G protein coupled receptor binding peptide is a Gα subunit carboxyl terminal peptide.

74. A method of claim 66, wherein said G protein subunit is a Gβγ dimer.

75. A method of claim 66, wherein said screening of step (c) is an enzyme-linked immunosorbant assay.

76. A method of claim 63, wherein binding to said G protein coupled receptor is determined by measuring a signal generated from interaction of an activating ligand with said G protein coupled receptor.

77. A method of claim 76, wherein activation of said G protein coupled receptor is determined.

78. A method of claim 76, wherein inhibition of said G protein coupled receptor is determined.

79. A method of claim 63, wherein said library of candidate compounds of step (a) is a focussed library of candidate compounds based on the structure of the peptide of step (b).

80. A method of claim 63, wherein said library of candidate compounds of step (a) is a combinatorial library.

81. A method of claim 80, wherein said combinatorial library is a diverse small molecule library.

82. A method of claim 81, wherein said diverse small molecule combinational library comprises drug-like molecules.

83. A method of claim 81, wherein said diverse small molecule combinational library is a focussed small molecule library.

84. A method of claim 83, wherein said focussed small molecule library comprises drug-like molecules.

85. A method of claim 84, wherein the members of said focussed small molecule library are based on the chemical structure of the peptide of step (b).

86. A G protein coupled receptor signaling inhibiting peptide identified according to a method of claim 37.

87. A G protein coupled receptor signaling inhibiting compound identified according to a method of claim 63.

88. A method of inhibiting G protein coupled receptor signaling in a cell having a G protein coupled receptor which comprises administering to said cell a compound identified according to a method of claim 1.

89. A method of inhibiting G protein coupled receptor signaling in a cell having a G protein coupled receptor which comprises administering to said cell a compound identified according to a method of claim 37.

90. A method of inhibiting G protein coupled receptor signaling in a cell having a G protein coupled receptor which comprises administering to said cell a compound identified according to a method of claim 63.

91. A method of inhibiting G protein coupled receptor signaling which comprises contacting a compound with said G protein coupled receptor which interferes with binding of said G protein coupled receptor to its cognate G proteins.

92. A method for identifying a G protein coupled receptor signaling modifier compound, which comprises:

(a) providing a peptide identified according to the method of claim 40, wherein said peptide is labeled to provide a detectable peptide signal;

(b) providing a library of candidate G protein coupled receptor signaling modifier compounds;

(c) contacting said peptide with said G protein coupled receptor under conditions such that said peptide binds to said G protein coupled receptor;

(d) removing unbound peptide from said G protein coupled receptor;

(e) measuring the signaling activity of said peptide-bound G protein coupled receptor and measuring said detectable peptide signal;

(f) contacting the members of said library of candidate G protein coupled receptor signaling modifier compounds with said peptide-bound G protein coupled receptor;

(g) measuring the signaling activity of said peptide bound G protein coupled receptor and measuring said detectable peptide signal;

(h) determining whether said G protein coupled receptor signaling activity is increased or decreased after contact with said candidate compound and whether G protein coupled receptor peptide binding is increased or decreased after contact with said candidate compound; and

(i) identifying compounds for which contact with said peptide-bound G protein coupled receptor results in both an increase in peptide binding to said G protein coupled receptor and an increase in G protein coupled receptor signaling and identifying compounds for which contact with

said peptide-bound G protein couple receptor results in both increase in peptide binding to said G protein coupled receptor and decrease a G protein coupled receptor signaling.

93. A method of claim 92, wherein the method for measuring said signaling activity of said peptide-bound G protein coupled receptor is selected from the group consisting of:

(a) measuring inositol phosphate accumulation;
(b) measuring intracellular Ca^{2+} levels;
(c) measuring transendothelial electrical resistance;
(d) measuring stress fiber formation;
(e) measuring ligand binding;
(f) measuring receptor expression;
(g) measuring receptor desensitization;
(h) measuring kinase activity;
(i) measuring phosphatase activity;
(j) measuring nuclear transcription factors;
(k) measuring all migration (chemotaxis);
(l) measuring superoxide formation;
(m) measuring nitric oxide formation;
(n) measuring cell degranulation;
(o) measuring GIRK activity;
(p) measuring actin polymerization;
(q) measuring vasoconstriction;
(r) measuring cell permeability;
(s) measuring apoptosis;
(t) measuring cell differentiation;
(u) measuring membrane association of a protein that translocates upon GPCR activation, such as protein kinase C;

(v) measuring cytosolic accumulation of a protein that translocates upon GPCR activation, such as protein kinase C;

(w) measuring cytosolic accumulation of a protein that translocates upon GPCR activation, such as src; and

(x) measuring nuclear association of a protein that translocates upon GPCR activation, such as Ran.

94. A compound identified by the method of claim 1, which comprises a peptide selected from the group consisting of SEQ ID NOS:14, 16, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 46-105, 115-132 and 147-305.

95. A compound selected from the group consisting of SEQ ID NOS:14, 16, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 46-105, 115-132 and 147-305.

96. A minigene construct encoding a compound according to claim 94.

97. A minigene construct encoding a compound according to claim 95.

98. A method for providing a therapeutic G protein coupled receptor signaling modifier peptide to a mammal which comprises administering to said mammal an expression construct which expresses a peptide according to SEQ ID NOS:14, 16, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 46-105, 115-132 and 147-305.

99. A method for treating a disease state in which excess G protein coupled receptor signaling is a causative factor, which comprises administering a compound according to claim 98.

100. A method of claim 98, wherein said peptide is delivered by an expression construct.

101. A method of claim 100, wherein said compound is a non-peptide drug.